FERTILITY AND ITS DETERMINANTS IN ROMANIA AFTER 1995

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Abstract:
This article provides an overall survey on fertility and its determinants in Romania after 1995. The empirical evidence presented in this paper supports the view that after the fall of the communism we register only five years of decline in fertility. After 1995 follows a very weak variation in fertility on the national level, but with significant differences between regions. Using a descriptive statistical analysis we emphasize the differences for fertility in these regions and we assume that the variation in fertility can be explained by demographic and economic variables. The results of the econometric model identify the principal determinants of the fertility variation in time and between Romanian regions after 1995.

Key words: *Fertility, demographic transition, economic and social determinants*

JEL classification: J11, J13

1. Introduction

The change in political regime after 1990 in Romania, which supposes a complex transition process, has been accompanied by demographic changes, as a decline in fertility and marriage, and a high rate of death and migration, with an accelerate process of ageing of population. Starting with 1998, in Romania were defined 8 development regions with the aim to coordinate the policy of regional development. In this context, the academic researches are focused to know very well the economic and social realities on regional level. Analyzing the evolution of fertility in Romania after the fall of the communism, we identify a very short period of decline between 1990 and 1995 which can be explained as a continuation of a previous trend of evolution (Jemna, 2011). After 1995, there is a weak variation in fertility on national level, around the average value of 1.35 children per women. In the same time, after 1995, we can see a significant variation in fertility between Romanian regions.

In this research paper is proposed an analysis of the evolution of fertility in Romanian regions. With the help of literature review and the statistical analysis we will show that the variation in fertility can be explained by a set of demographic and economic variables. Using an econometric model we identify the specific determinants of the fertility in Romanian regions after 1995.

The basic hypothesis in this paper is that the variation of fertility in the Romanian regions can be explained with the help of the second demographic transition theory, but in the Romanian specific context: in an economic and social transition process and with significant differences between regions.

In the following, the paper is structured as follows: section two deals with a brief review of approaches to the theme in the literature. The next section concerns the methodological and statistical data used in the fourth section, which concerns the empirical study. The paper ends with conclusions and references.

2. Theoretical aspects on fertility in Romania

Fertility changes in the Central and East European (CEE) countries after 1990 were analyzed in the literature singularly or in the context of demographic changes, in

general, trying to identify the causes and, also, solution for reinforcing the phenomenon (Philipov and Kohler, 2001, Blom et all., 2010, Rodin, 2011, Sobotka, 2002, Brainerd 2009, Philipov, 2002; Rychtaríková, 1999, Wetherell and Plakans 1997; Sobotka, 2003; Alexandrescu, 2005; Mureşan et all, 2008, Jóźwiak and Kotowska, 2008, Ranjan, 1999, Cornia and Paniccià, 1996, Philipov and Dorbritz, 2003, Lesthaeghe, 2000, etc.). The main explanatory hypotheses for the demographic evolution of the former communist countries of Europe are three, in summary, as following: i) the evolution of fertility has only a demographic explanation (Zakharov and Ivanova, 1996; Rabušic, 1996; Zakharov, 1997; Vishnevskii, 1999; Rychtăriková, 1999, Sabotka et al., 2003), on the line of the second demographic transition theory; ii) the demographic decline is the result of poor economic situation, with low living standards (Kohler and Kohler, 1999; Ranjan, 1999) and specific social transformations in transition countries (Cornia and Paniccià, 1996); iii) the fertility changes are the result of the social and economic transition and demographic transition (Billingsley, 2010).

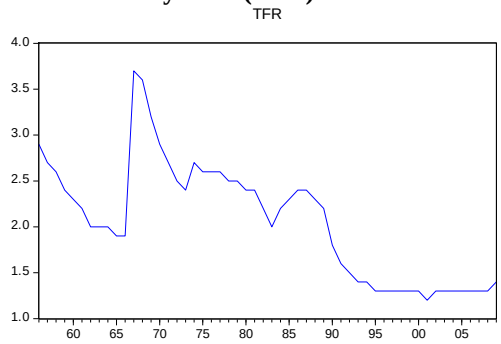
After 1990, the Romanian population was involved in an economic and social transition process, characterized in particular by conjectural variations and uncertainty. These kinds of realities have determined the researchers to consider that the social and economic conditions of post-communist countries of CEE, including Romania, have a negative impact on demographic level in these countries (see, for example, Sobotka, 2003). Ranjan (1999) give emphasis to the relationship between income uncertainty and fertility of the individuals within the CEE countries. We consider that uncertainty of Romanian residents was determined by the high rate of unemployment and weak family policies, also. In this context, postponement was considered a correct behavior by Romanian people in terms of economic uncertainty.

The theory of rational action of the individual on the line of the second demographic transition theory, take into consideration these economic and social changes in the countries in transition. Studies of this category emphasize the concept of "postponement transition" (Kohler et all., 2002; Billingsley, 2010). Thus, the postponement mentioned by the theory of demographic transition is supplemented by a delay that occurs as a rational response to economic uncertainties existing in the process of transition to market economy. Even if the theory of the second demographic transition ask for a certain economic stability and specific demographic behavior of developed countries of West of Europe, this approach assumes a transition economy and demographic changes that are sensitive to the parameters of the transition.

In Romania, the total fertility rate (TFR) on a long period of time, respectively 1960-2010, compliance the conditions laid down by theory of second demographic transition, but in the specific conditions of this European area. Even if in 1990 the TFR continued to decrease faster, this year can't be a critical point in the dynamics of fertility in Romania. It is true that the average number of births a woman would have in her lifetime declined in average by 1 child, from 2.2 in 1989 to 1.3 in 2004 (See Figure1), but the decrease in fertility since 1989 has an ancestor in the second decade of the '70s. Thus, short-term fluctuations in fertility are coming back with some regularity, such as, for example, during 1972-1982 and 1985-1995.

Stabilization of fertility and demographic trends generally take place in Romania after 1995 and take into account the basic assumptions of the theory of demographic transition. Specific conditions of socio-economic transition period require a empirical verification of these hypotheses, and identify the main determinants of demographic changes in this period. Studies conducted on Romania in this respect are not very numerous (see Alexandrescu, 2005, Mureşan et all, 2008, Rotariu, 2006) and regional analysis is very little explored.

Figure 1: Total Fertility Rate (TFR) in Romania in 1960-2005



Source: Developed by authors

3. Data and method

In accord with literature and other previous studies (Jemna, 2012) for fertility study we identified the following set of independent variables: marriage and divorce rates, women's average age of first marriage, female participation on labor, old age dependence, unemployment rate, GDP (corrected using the deflator), level of urbanization. As dependent variable we use the general fertility rate (number of children per 1,000 women group of fertile age), because official data sources do not provide information about total fertility rate by counties or at the region level. The limiting number of explanatory variables to 8 is a consequence of lack of statistics data in Romania. For general fertility rate, official data by region are available only since 2003. For the period 1995-2002 data were calculated by the authors as a weighted average of rates by county, information is available only at this level. Since the Bucharest-Ilfov region has values that differ significantly in the distribution of all regions for the variables studied, we chose to eliminate this region from the study.

For the econometric modeling, we choose the panel model that combines the variation over time and between regions. To highlight the differences between regions, we opted for a fixed effect panel model. These effects are estimated with the model parameters.

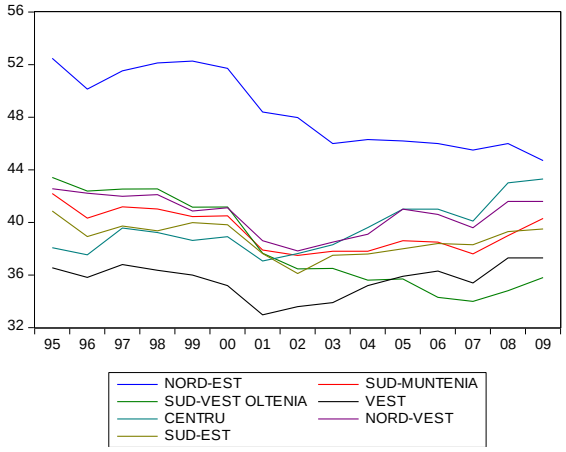
For econometric modeling quality was tested hypothesis of variables stationarity by the help of test panel unit root test. Nonstationary variables were transformed using difference operator of order 1 and appear in the model with this operator.

In this study, for the statistical data we used several official sources: National Institute of Statistics from Romania, official statistical counties institutes of Romania, National Bank, National Commission of Forecasting.

4. Empirical evidence of regional fertility in Romania

Some Romanian regions showed a slight downward trend of fertility in the period 1995-2009, with large differences in intensity between regions. Between 1995 and 2002 fertility is in a continuous decline in all regions (Figure 2). After 2002, 5 of the 7 regions have a slight recovery, while regions NE and SW Oltenia continue downward trend. The region with the highest level of fertility in Romania is the Nord-East Region, but, in the same time, is the region with an important and continues decreasing in general fertility rate. For explaining this evolution and differences between regions, we analyze the evolution of explanatory variables and outline some hypotheses which will be tested using econometric modeling.

Figure 2: The evolution of general fertility rate in the Romanian regions in the period 1995-2009



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The hypothesis that marriage and divorce are important determinants of fertility is confirmed by the analysis of available data on regions. In the Romanian regions, marriage factor has the same evolution with fertility between 1995-2002 and 2002-2009. A strong variation in the period 2006-2008 is explained through legislative measures that encouraged marriage in Romania. This was a term impact, such as in 2009 values back to the year 2005 situation. The highest rate of marriage is registered for all regions in 2007.

Divorce rate is different in intensity on regions and its fluctuations are different from one region to another, with slight downward trend to the end period. As shown in the evolution of indicators, we expect that divorce does not have a significant impact on fertility in the regions in Romania.

Figure 3: Marriage rate

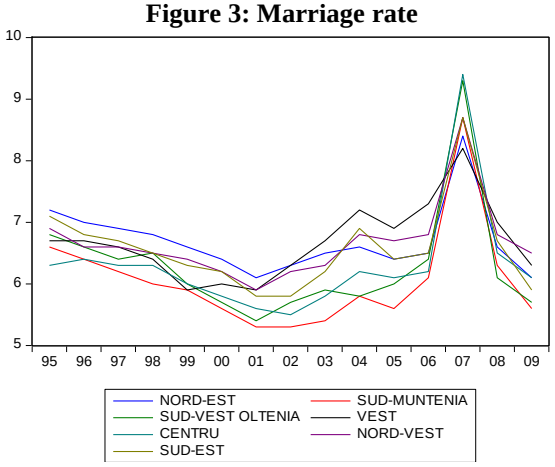
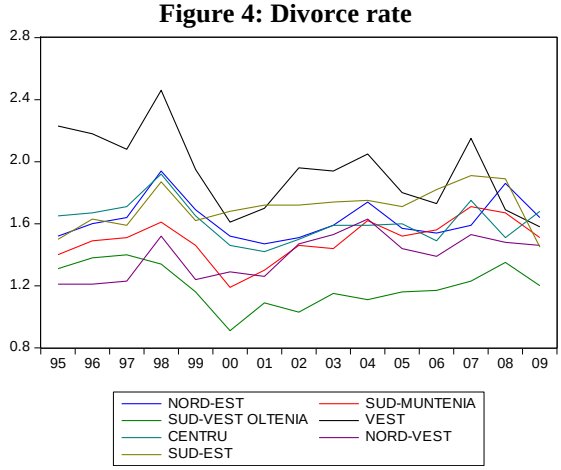


Figure 4: Divorce rate



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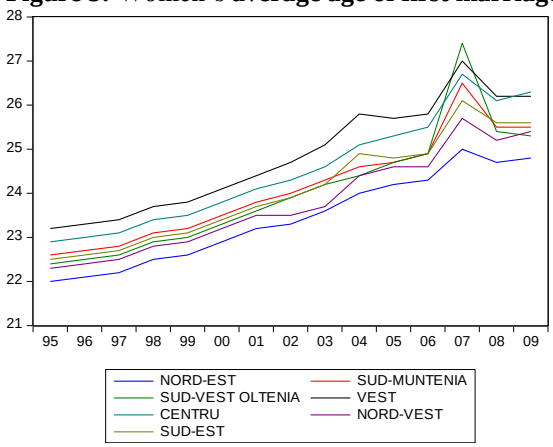
Another explanatory factor for the decline of fertility is postponement (Monika 2010, Philipov and Kohler 2001, Rodin 2011), and this indicator is taken into account by the literature to explain the phenomenon of demographic transition. Due to lack of postponement data, we will use the variable average age of women at first marriage only. As seen in Figure 5, this indicator has increased significantly throughout the period and for all regions. We expect to be a negative impact on fertility.

Figure 5: Women's average age of first marriage



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Statistical data show fluctuations for the evolution of the participation of women on the labor market throughout the period with different intensities from one region to another. A decreasing trend quite pronounced in indicative values is observed for all regions and throughout the period. Thus, the hypothesis of the negative impact of socio-economic changes have occurred since 1990 on fertility is not supported in our country if we analyze the evolution of the participation of women on the labor market. This result is not surprising, because during the communist period woman was heavily involved in economic activity and domestic life. After 1990, the transition has reduced female employment, parallel with reducing fertility.

Regarding the implications of unemployment on fertility, the literature suggests that unemployment has a negative impact during the economic and social transition for ex-communist countries. The unemployment in Romanian regions follows the same pattern with differences in intensity. In general, unemployment is a downward trend. Deviations from this trend are between 1996-1999 and 2008-2009. We expect this decrease in unemployment have a positive impact on fertility.

Figure 6: Female occupation rate

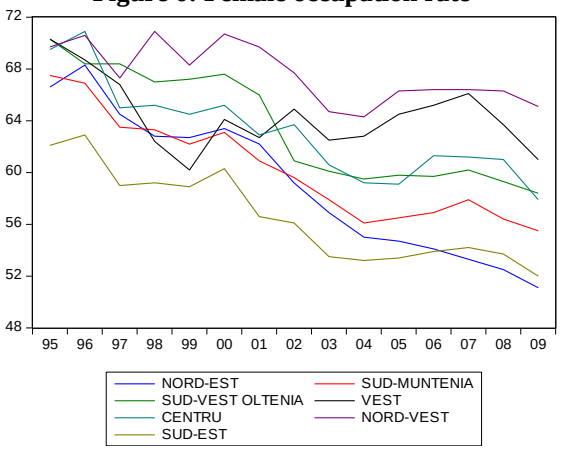
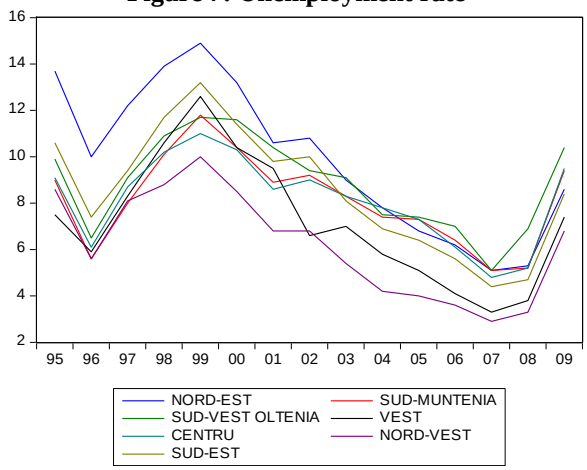


Figure 7: Unemployment rate



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Using the Panel Least Square method to estimate the Econometric model we obtain the results in Table 1. These results show that from the 8 independent variables 4 of them have significant impact on fertility variation in the regions during 1995-2009. With positive impact of these variables is: female occupation, unemployment and urbanization. The positive impact of unemployment is somehow surprising and deviates from the assumptions made in the literature. But considering the specific of Romanian regions and the fact that unemployment was a downward trend, this result could be

accepted provided the evaluation of this relationship in further studies. A negative sign of the regression coefficient has registered the average marriage age for women. This result does not deviate from the theory of demographic transition and is in accord with Romanian demographic trend. It is important to observe that the economic development (GDP) has no significant impact on fertility. And this result is important for further study of the Romanian regions. As we assumed divorce and old age dependency, as a measure of the degree of demographic aging have no significant influence on fertility.

Table1: Results of the econometric model

Dependent Variable: TFR
Method: Panel Least Squares
Sample (adjusted): 1997 2009
Periods included: 13
Cross-sections included: 7
Total panel (balanced) observations: 91
Cross-section weights (PCSE) standard errors & covariance (d.f. corrected)
Convergence achieved after 16 iterations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDP	-2.85E-05	5.80E-05	-0.491877	0.6242
MARRIAGE	0.251838	0.229488	1.097389	0.2760
D(OCUP_FEM)	0.096043	0.043201	2.223170	0.0292
D(UNEMPL)	0.279065	0.090920	3.069331	0.0030
URB	0.331790	0.193005	1.719076	0.0897
DIV	-0.533725	0.682086	-0.782489	0.4364
D(DEP_AGE)	-0.237814	0.714730	-0.332733	0.7403
D(AV_MAR_AGE)	-0.643917	0.246425	-2.613030	0.0108
C	19.66275	10.42426	1.886249	0.0631
AR(1)	0.851164	0.070913	12.00288	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.952659	Mean dependent var	39.84936
Adjusted R-squared	0.943191	S.D. dependent var	4.165766
S.E. of regression	0.992897	Akaike info criterion	2.981897
Sum squared resid	73.93835	Schwarz criterion	3.423367
Log likelihood	-119.6763	Hannan-Quinn criter.	3.160003
F-statistic	100.6167	Durbin-Watson stat	2.240443
Prob(F-statistic)	0.000000		

Inverted AR Roots .85

Source: Developed by authors

After eliminating insignificant variables, estimated equation of the model is as following:

*FERT = 0.1454*D(OCUP_FEM) + 0.2346*D(UNEMPL) + 0.3065*URB - 0.3602*D(AV_MAR_AGE) + 23.2282 + [CX=F] + [AR(1)=0.857]*

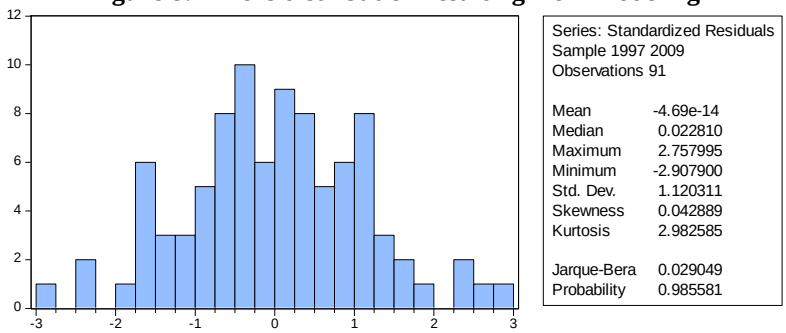
Table 2: Cross-section Fixed Effects

REGIUNE	Effect
NORD-EST	9.188900
SUD-MUNTENIA	2.694066
SUD-VEST OLTENIA	-4.135374
VEST	-6.911214
CENTRU	0.256185
NORD-VEST	0.685639
SUD-EST	-1.778201

Source: Developed by authors

As econometric modeling methodology requires we checked assumptions on residual component. In a preliminary version of the model we checked the existence of autocorrelation errors, which was settled in final model by estimating autoregressive component AR. Also, for correcting heteroscedasticity, we used the method of modeling error correction with Cross-section weights (PCSE) standard errors & covariance method, which offers homoscedasticy errors. Finally, the normality assumption of error is confirmed by Jarque-Bera test (Figure 8).

Figure 8: Errors distribution resulting from modeling



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5. Conclusions

Analysis of fertility and its determinants in Romanian regions sustain the approach whereby fertility decline is achieved as a long-term phenomenon that meet the basic assumptions of the theory of demographic transition, but in the social and economic parameters specific to Central and East European area. As we expected there are big differences between Romanian regions on the variables established by literature with influnce on TFR. Econometric modeling allows validation of assumptions made in this paper: the fact that female occupation, unemployment, the average marriage age for women and urbanization has significant effect on the TFR.

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